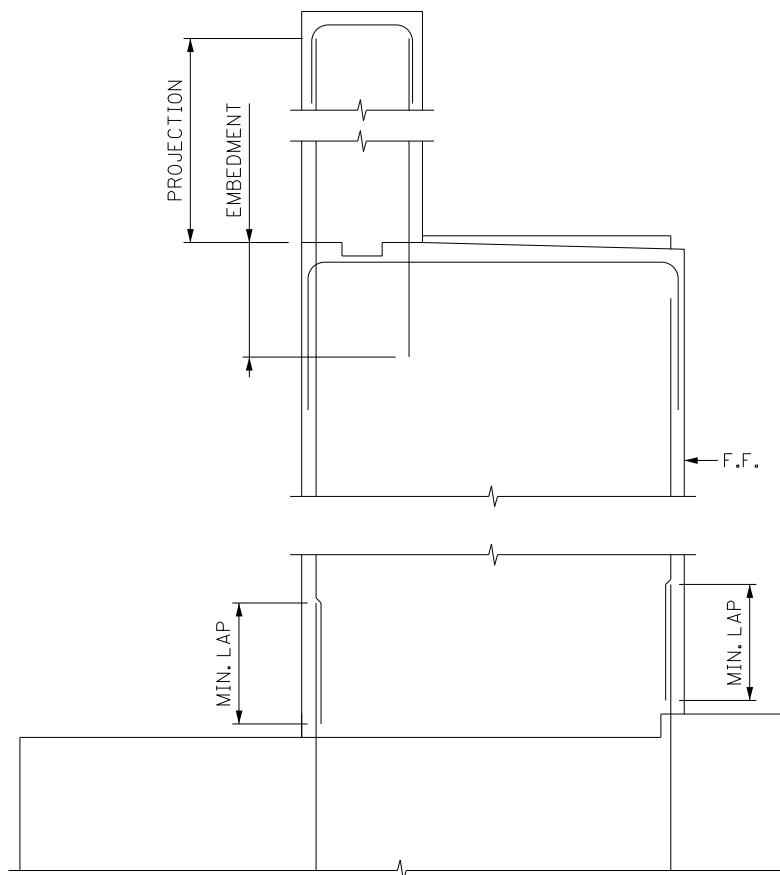


# Suggested Reinforcement Detailing Practices

Based on comments from R&D and ES-ESS Committees

## General

1. When detailing substructures, it is preferable not to use series bars unless necessary. The first choice is to use “slack” in the bar laps to accommodate a variety of heights.
2. When a series of bars is required, provide a minimum of 2” difference between each bar in the series. If the difference from the shortest to the longest is not sufficient to maintain that minimum, use different bar marks for each bar or group of bars.
3. When a bar extends from one concrete pour to the next, dimension the minimum lap length, the embedment length, or the projection length. (See Figure 1.) If the bar is bent, show the minimum lap length. If the bar is straight, show the embedment or projection length.

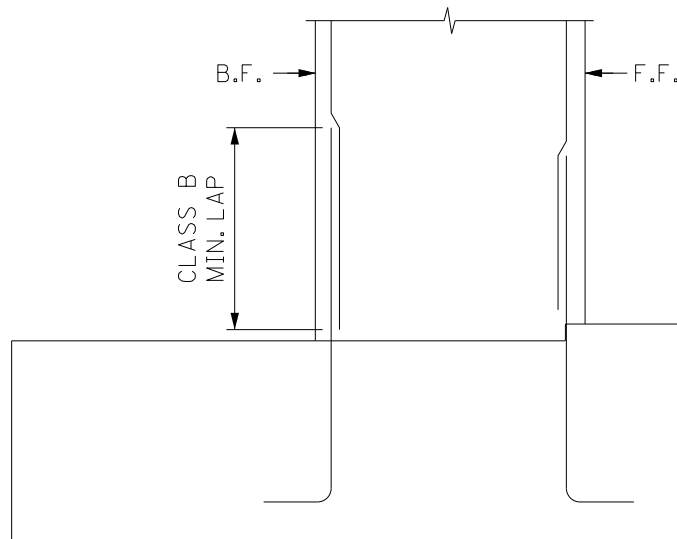


**Figure 1**

4. Bar lengths, splice lengths, and cover dimensions do not need to be adjusted to accommodate potential fabrication or construction tolerances unless specifically mentioned in this document or the LRFD Bridge Design Manual.
5. When detailing clear dimensions, only put the distance required (i.e., 2” clear, not 2” clear (min)). When dimensioning deck thickness, include minimum with the dimension (i.e., 9” (min), not 9”).

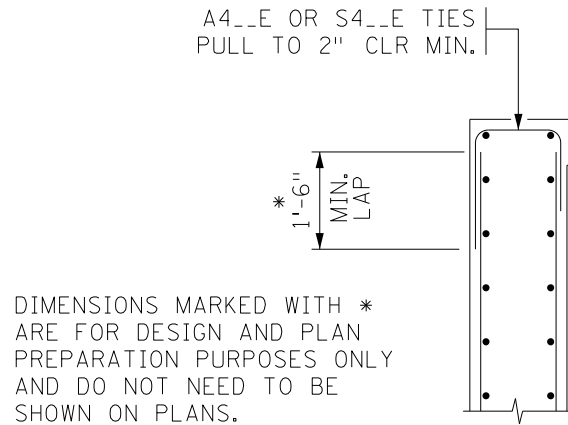
## Dowels and Vertical Reinforcement

1. Compute dowel bar lengths assuming the design lap plus an additional 2 inches. Also, dimension dowels with sufficient length to accommodate any variation in wall height.
2. Dimension laps between dowel bars and vertical bars in the plans rather than the projection from the top of the footing. Show the lap starting from the end of the vertical bar rather than the top of the concrete. (See Figure 2.)
3. Show vertical bars in abutments, wingwalls, retaining walls, and other similar situations as ending above the top of the footing. (See Figure 2.) This provides visual clarity for the drawing, but does not necessarily reflect how the bar will be placed during construction.
4. Compute vertical bar lengths assuming the bar will be placed directly on the footing.



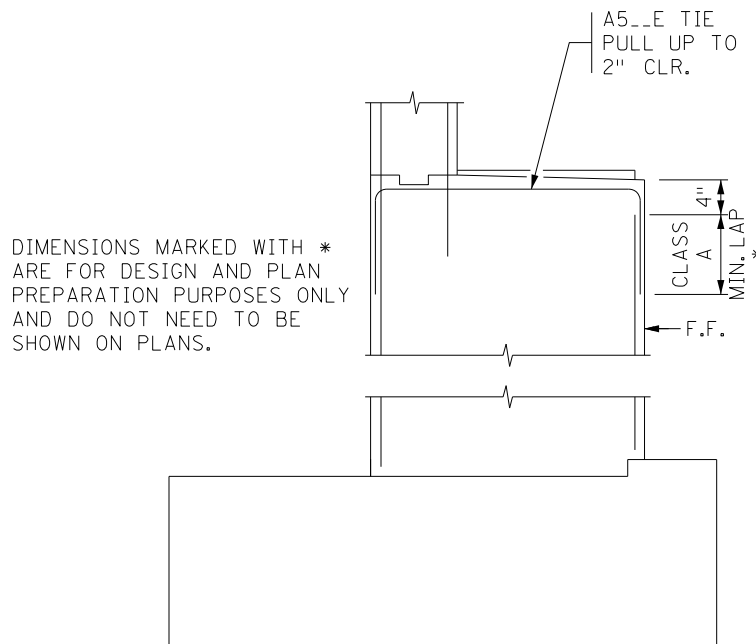
**Figure 2**

5. For wingwalls that do not have a barrier mounted on top, use a U-shaped tie at the top of the wall. (See Figure 3.) Ties are not needed at the ends of wingwalls or at the bottoms of wingwalls that cantilever past the end of a footing. Additionally, ties are not necessary on the tops of wingwalls with a barrier mounted on top, as long as the barrier dowel is adequately lapped to the wingwall vertical bars. Choose bar marks for the ties that correspond to the concrete pour associated with them, i.e. - if the concrete around them is abutment concrete, designate them as A bars; if the concrete is superstructure concrete, designate them as S bars.



**Figure 3**

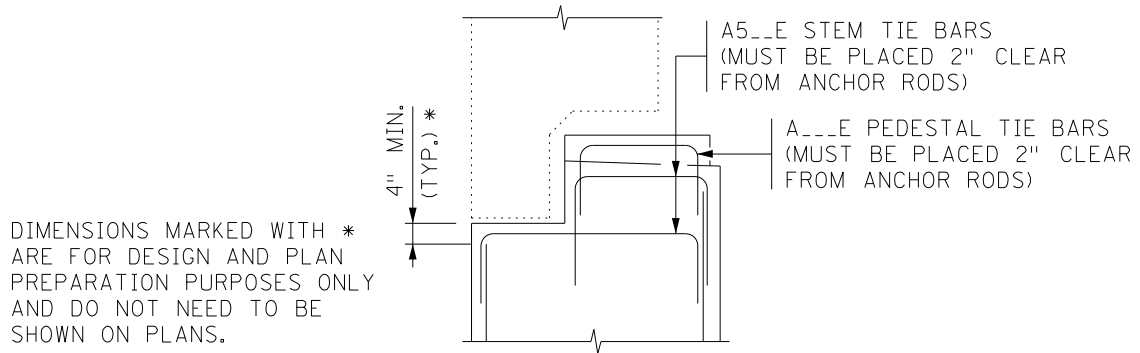
6. Leave the front face vertical bar 4" short of top of wall (or seat) or more as required to account for a sloped top surface. Extend length of A5\_E abutment seat tie to ensure proper lap length. Space abutment seat tie bars with the verticals. Use a series if the slope is extreme. Otherwise, keep verticals to a single length. Some laps will exceed the minimum. (See Figure 4.)



**Figure 4**

**Abutment Reinforcement**

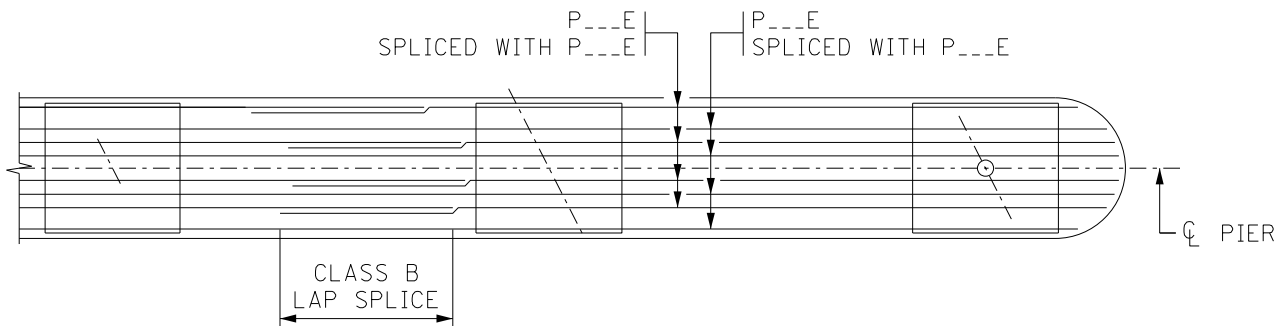
1. For semi-integral abutments, space the A5\_\_E stem tie bars along the entire length of the abutment, even under the pedestals. They are not replacements for pedestal tie bars. (See Figure 5.)



**Figure 5**

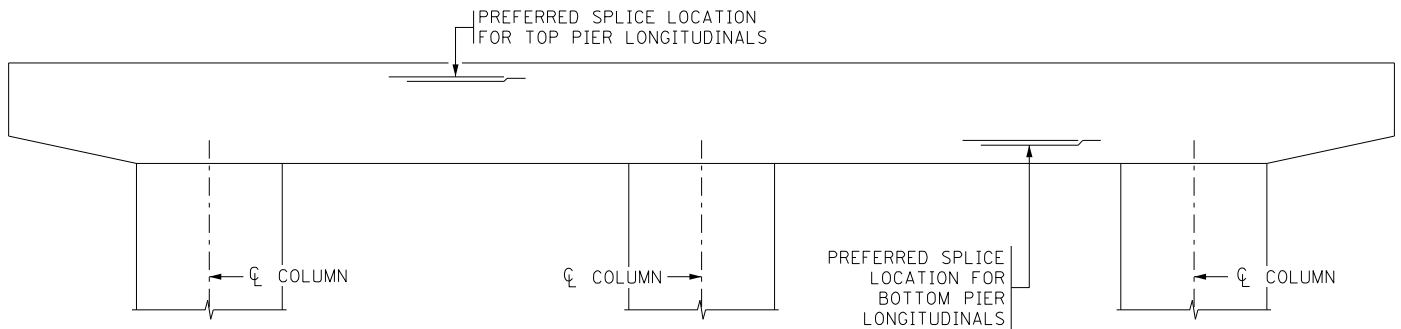
**Pier Cap Reinforcement**

1. Splice all longitudinal top bars to allow for adjustment in overall length at the ends of the pier cap (especially important for pier caps that do not have square ends). (See Figure 6.)
2. Use the same two bar marks with alternating lap location for all top longitudinal bars in the pier cap. The amount of lap may exceed the minimum, where the total length is shorter. (See Figure 6.)



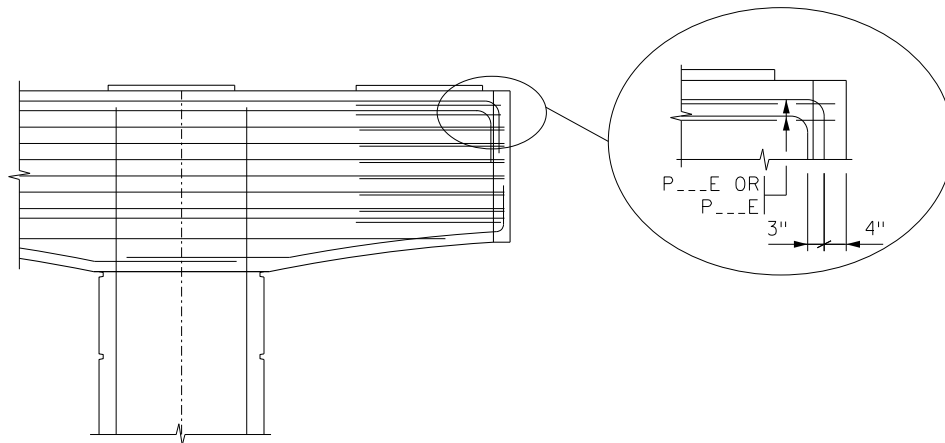
**Figure 6**

3. Do not place splices at locations of maximum moment. For cap top bars, do not splice over columns. If cap bottom bars are spliced, do not splice at the midpoint between columns or directly over columns; place splice adjacent to column. Avoid placing splices where bearing anchor rods are located. (See Figure 7.)



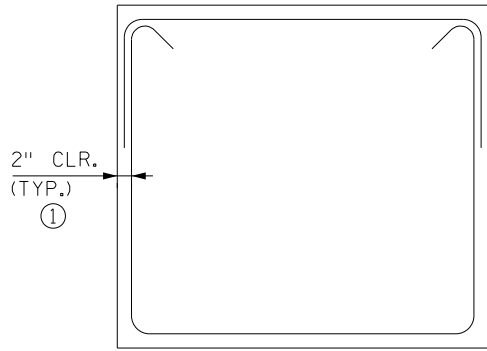
**Figure 7**

4. When detailing ends of pier caps, consider actual bar bend radii and locations to avoid conflicts. Figure 8 shows an example of good detailing of bent bars at the end of the pier cap.



**Figure 8**

- When single stirrups are used in a pier cap, include the note shown in Figure 9.

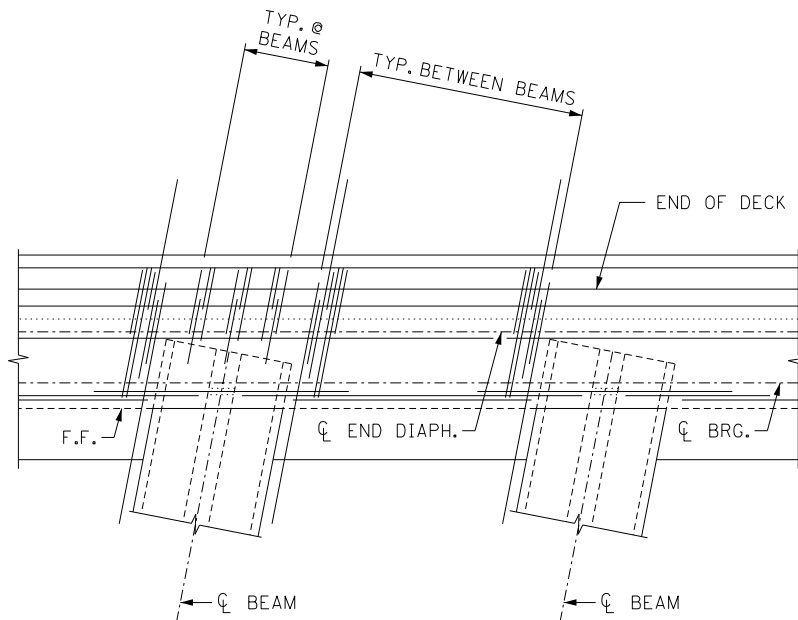


① 1/2" IS PERMITTED TO ALLOW FOR BAR TOLERANCE ONLY WHEN SINGLE STIRRUPS ARE USED. CENTER STIRRUP IN PIER CAP. CAP WIDTH SHOWN ON PLANS CANNOT BE REDUCED IN CONSIDERATION OF THIS CLEARANCE.

**Figure 9**

**Deck Reinforcement**

- When the total length of the top transverse bar exceeds 60 feet, splice the top transverse bars to allow for adjustment in overall length at the outside edge of the bridge deck.
- When the total length of the top transverse bar is 60 feet or less, detail the bar with 2" clear to the edge of the deck, but compute the bar length assuming 2 1/2" clear. This will result in the top transverse bars being 5" shorter than the total deck width. Detail the bottom transverse bars with 4" clear from the edge of the deck.
- When detailing concrete end diaphragms for integral, semi-integral, or parapet abutments, place transverse diaphragm bars parallel to the beams. (See Figure 10.)



**Figure 10**